JPRS-WST-86-010

17 March 1986

West Europe Report

SCIENCE AND TECHNOLOGY

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WEST EUROPE REPORT
SCIENCE AND TECHNOLOGY

CONTENTS

ADVANCED MATERIALS

EUROPEAN PRODUCTION OF REINFORCED THERMOPLASTICS GROWING

Paris L'USINE NOUVELLE in French 12 Dec 85 pp 69-71

[Article by Pierre Laperrousaz: "Fabricated Thermoplastics: From Automobiles to Television Antennas"]

[Excerpts] Very short processing cycles, increased resistance to shock combined with a high rigidity: This is the cocktail of properties with which the fabricated reinforced thermoplastics attack the automobile market as well as other sectors as varied as lawn mowers and parabolic antennas.

The newest Peugeot model, the 309, contains two parts unnoticed by the general public. Nevertheless, they represent an innovation in the field of materials. One of these parts is concealed under the front shield, an "insert" for absorbing shocks. The other part is hidden under the hood: It is the support of the motor-ventilator set (GMV), carrying the radiator fan, engine and radiator.

These two pieces are in fabricated reinforced thermoplastic (TRE), a composite. The matrix of this composite is in polypropylene and the reinforcement in long glass fibers. Its processing procedure makes it very original: It starts from a semifinished product in the form of plates which are preheated to the point of melting and which are then pressed in a cold mold.

A Very Complex Material

The properties of TRE combined with a high processing speed explain its breakthrough in the auto industry. This will remain its major market for a long time.

"In 5 years' time, the European consumption of reinforced themoplastics should reach 25,000 to 30,000 metric tons annually, of which at least 70 percent will be in the auto industry," estimates Henri-Paul Benichou, responsible for marketing at Symalit, the leading producer of TRE in Europe. Licensee of PPG, established in Lenzburg, Switzerland, Symalit will supply 1,200 to 1,500 metric tons in 1985. "With the new pieces appearing both in the FRG and France, 1985 is a turning point for us which confirms our hopes," says Henri-Paul Benichou.

Except in the auto industry, the applications of TRE are still rare, but very divergent: welder's masks (United States), electrical guitar cases (Gibson in the United States), the plates of a lawn mower, parabolic TV aerials (Sony), containers for fragile materials. This last application is to be soon launched in France where the company Composites et Conteneurs is negotiating with a munitions manufacturer to supply disposable containers. These would be produced by Bauzer in Saint-Etienne. Composites et Conteneurs also markets anti-electromagnetic radiation protective containers for the transportation of computer diskettes. The protection is assured by a metal grill which is sandwiched in at the moment of molding.

Until very recently, Symalit was the only supplier of semifinished TRE products in Europe, with an established capacity of 6,000 metric tons per year. Since then BASF has joined the ranks. Isosport in Austria, in cooperation with AKZO, has also developed products with a matrix of polyamide and polyester (PET) [polyethelene terephtalate]. They have a greater performance than competing polypropylene-based products, but they are more expensive. Solvay, ATO and Montedison may also have some projects, not to mention AOP, which is trying to develop its own process.

TRE is in fact a complex material, and, according to Andre Gerard, head of the advanced service studies in the Plastics and Composites Department of PSA: "If you want to understand what happens when the material is processed, you should stick your nose in the material." This is also a good way to exert pressure on the price!

All these producers have to reckon with an outsider: Arjomari. This paper manufacturer has adopted its own techniques to the production of TRE. Baptized Arjomix, this product exhibits its origins as a paper product. This TRE is in fact a form of cardboard composed of 30 percent 6-mm long glass fibers and 70 percent propylene in very fine powder. It is quite different from other competing products, the matrices of which are melted at the moment the reinforcement is incorporated. Despite its short fibers, its properties are distinctly equivalent. "Its shock resistance is much better than we hoped it would be," they say at PSA.

The short length of its fibers is also an advantage. They can easily follow the material during its flow through the mold, and in this way they are better distributed in the part. Consequently, its mechanical characteristics are more homogeneous. Arjomix, which is in the process of type approval at PSA for GMV support, might turn out to be a formidable opponent. As of now, Arjomari has a capacity of 5,000 metric tons based upon a modified papermaking machine. It can very quickly double its capacity without too many expenses with inferior papermaking machines.

As far as the processors are concerned, the choice is also growing. AOP, the first in France, has been joined by Stratinor, which has a highly automated installation in Limoges for the molding of inserts for bumpers for the 309. The SMC [Sheet Molding Compound] processors, fearing competition, are actually planning to add the new material to their range, especially because the same equipment can be used with a few adaptations. RCMP in Privas has been working for 2 years on the research and development of the Arjomari product.

Metal processors have also entered the race, for example Bauzer in Saint-Etienne. This cutting and stamping specialist has modified some of its presses and has already some products to its credit: arches for clamp-on probes for EdF [Electricity France], turning parts for textile machines, etc. In the future, Bauzer hopes to realize 15 percent of its actual Fr 30 million turnover in TRE: "This means a slow retooling without radically changing our industrial methods," says Andre Malian, its chief executive officer.

25027/12624
CSO: 3968/1049-A

ADVANCED MATERIALS

FRANCE'S LAFARGE REORGANIZES CERAMICS RESEARCH

Paris L'USINE NOUVELLE in French 2 Jan 86 p 18

[Article by Helene Constanty: "The End of Lafarge Refractaires"]

[Text] The subsidiary company of Lafarge is going to disappear. A good part of it will join a consolidation created within the heart of the group. The objective is clear: to create and launch new products along new business lines.

Lafarge is putting an end to its ambitions in refractories. Before long, then, Lafarge Refractaires will no longer exist. Two of its subsidiaries are going to join with the SEPR [European Company of Refractory Products] (of the Saint-Gobain group), which has recently been introduced into the second market of the Paris Stock Exchange. Thus, ceramic fibers (240 personnel, Fr 130 million turnover) and insulating refractories (50 personnel, Fr 20 million) will be added to the two companies already taken over by the SEPR last spring: Provins and Savoie Refractaires.

As for the production of monolithic refractories (unshaped products), Lafarge Refractaires will be reidentified as Houveaux Materiaux. An operational group has indeed been created using this name. Under the management of Claude Henrion, the current general manager of Lafarge Refractaires, two currently very distinct poles will be united: monolithic refractories and industrial and auxiliary mortars, a division until now attached to Ciments Lafarge France. The new group will account for Fr 900 million and employ 900 people (two-thirds "mortars" and one-third "refractories").

What is the meaning of this merger? Above all, why are refractories, generally regarded as the "oldest products in the world," called "new materials?" The cooperative action proposed by those in charge of the group is not apparent at first glance. Ready-to-use mortars, renderings, outdoor insulating products and additives are directed toward public works and building companies, while unshaped refractories have industry as a client.

"The creation of the new materials division thus responds to a double technical and prospective logic," answers Claude Henrion. "The two categories of products have the same origin: they are the result of complex component mixtures."

To Lafarge, it is therefore a bet on the future. The term "new materials" has to be understood as materials of the future. The new operational group must invent and develop products with a view toward new applications for sectors other than construction and public works and in industries working with fire, where present-day markets are to be found.

The rationalization is not yet complete. It will be once Saint-Aulaye, the Lafarge Refractaires plant specializing in products for the ceramics industry (130 personnel, Fr 40 million turnover) is reorganized. Thus, each takeover solution will be conditioned by its reorganization. However, in 1985 their accounts were still in the red.

25031/12624
CSO: 3698/1055

ADVANCED MATERIALS

FRANCE'S RHONE-POULENC REORGANIZES PLASTICS RESEARCH

Paris L'USINE NOUVELLE in French 2 Jan 86 p 22

[Article by Pierre Laperrousaz: "Rhone-Poulenc Concentrates Its Laboratories"]

[Text] The CLYPT is born: The research and development center for Rhone-Poulenc's plastics research has just opened near Lyons, with 4,000 square meters of laboratories and workshops and 15 engineers.

The leading French manufacturer of technical plastics owes itself a research and development center worthy of its name. This has now been accomplished. Rhone-Poulenc (approximately 50,000 metric tons of technopolymers per year) has just inaugurated its center for technical plastics in its Belle-Etoile factory in Saint-Fons, south of Lyons.

The new center is officially known by its acronym: CLYPT. A rather uncouth name, perhaps, but what really matters is what is concealed behind its walls: 4,000 square meters of laboratories and workshops, where 60 people work, including 15 engineers. The CLYPT, which includes facilities that were previously scattered throughout the Lyons region, makes the connection between more fundamental research, conducted in the nearby center of Carrieres, and industrial use. For this purpose, it is organized in five stages which follow the steps that an idea passes from conception to realization.

In the CAD innovation stage, the application, created in collaboration with the partner-client, is developed. Here, the characteristics of the material and the design of the product are determined. To this end, the center is equipped with the Procop system (developed by Cisigraph in collaboration with Rhone-Poulenc and other industrial partners) for the thermomechanical calculation of structures and the calculation of the flow in the molds.

Next, the color-formulation stage is concerned with developing the formula needed for the application on the basis of polyamide 66 (of which Rhone-Poulenc is the leading European manufacturer and second in the world after Du Pont) and other plastics of its type (thermoplastic polyesters, block-amide polymers, polyimides).

A Special Stage Dedicated to Polyimides

On the average, a workshop consisting of six extrusion granulation lines produces one or two formulas per day. Rhone-Poulenc lists more than 500 polyamide formulas in its catalog. Additionally, the color-formulation laboratory, which is equipped with the computerized Procolor system, can produce color formulations in record time.

The transformation stage tests these new formulations, manufactures the standardized test pieces for the product evaluation laboratory and ensures the quality of the test molds. Six injection presses of 25 to 250 tons locking force are provided. These machines are rented out to equipment manufacturers, which is a good way to dispose of the best performing models at any given moment. Some are equipped with instruments to evaluate the material's aptitude for change through specific tests (among others, a test of plastification which measures the mechanical energy absorbed by the melted material, and a test of the speed of recapturing bending rigidity which indicates the aptitude of a material to be quickly removed from a mold).

A special stage is devoted to polyimides (Kinel and Keremid), of which Rhone-Poulenc is the leading world producer. These are materials which can be found in automobile cigarette lighters, as well as in CFM-56 reactors. Polyimides also have many other applications, ranging from gears to multilayer circuits for electronics.

25031/12624
CSO: 3698/1055-A

AEROSPACE

NORWAY PLANS AEROSPACE BUDGET IN VIEW OF ENTERING ESA

Oslo AFTENPOSTEN in Norwegian 14 Jan 86 p 60

[Article by Ulf Peter Hellstrom: "Norway Should Increase Aerospace Efforts Fivefold"]

[Text] Norway should increase her aerospace efforts fivefold before the end of the century. This is the main conclusion in a public report which was submitted to the Industry Ministry yesterday. A committee with previous Industry Minister Finn Lied as chairman advocates the establishment of a new foundation--Norwegian Space Center--and an increase in public appropriations for aerospace to altogether 220 million kroner in the year 2000. The mainstay of the Norwegian space activity will be Norway's upcoming membership in the European Space Organization ESA.

"The rational starting point for our unanimous recommendation is that it will take 15 years before Norway will be a fully equal member of ESA," Finn Lied said during a press conference after the recommendation had been submitted to the Industry Ministry.

The Norwegian appropriations to ESA are currently in the order of 30 million kroner. They must be increased fivefold towards the year 2000. In the opinion of the publicly appointed committee the government should appropriate an additional 30 million per year for the operation of national installations such as the Andoya rocket launching field, the Tromso telemetry stations and other installations and 40 million kroner per year for industry and research. In other words, the committee recommends that the public appropriations for space activities altogether be increased to the order of 2.5 billion kroner in current kroner in the coming years to prepare Norway for becoming an aerospace nation towards the turn of the century.

User Nation

The committee states that Norway is a potentially large user nation of space-based services, for instance in the field of maritime and other satellite communication and remote satellite surveying of ports, islands and coastal areas. Many of the future services which the country can use can only be solved with the aid of this new technology. In addition, Norway has ambitions to build up a high-technology, knowledge-based industry as a link in the industrial restructuring in Norway and the change of the work distribution on a global basis.

Norway must therefore carry out conscious and government-led efforts in aerospace. By the end of the 1990s the Norwegian space efforts must have developed to a level comparable to that of other European countries. This requires a willingness to contribute on the part of the government, research and industry," the committee feels.

The Lied committee suggests that a new agency with the name Main Committee for Norwegian Aerospace Activity be established under the Industry Ministry. This agency should formulate the Norwegian space policy. In addition, the Norwegian Aerospace Center should be established as an executive and separate agency. The Norwegian Aerospace Center should be a foundation, and in the committee's opinion the space activity which today comes under the Royal Norwegian Council for Scientific and Industrial Research should be included in the Norwegian Aerospace Center.

ESA

Kjell Hanssen, permanent secretary in the Ministry of Industry told during the press conference that the upcoming membership in the European space organization ESA will bring a number of industrial and knowledge-related advantages for the Norwegian sectors. As we know, according to the plan Norway will become a full member of ESA on January 1, 1987, but the matter will first be discussed in the Storting.

Up to now, Norwegian industry has been most involved in supplying the earth stations. The EB-group in particular has become a major supplier to the satellites' earth stations, but also firms such as Kongsberg Vapenfabrikk, Raufoss Ammunisjonsfabrikker and AME in Horten have expressed an interest in concentrating on this new technology.

Over a period of ten years Norwegian firms and organizations buy satellite equipment for 1.5 - 2 billion kroner. Almost all purchases have to be labeled imports. However, on the user side, Norway is one of the world's leading nations. The Norwegian Televerket [government agency administering telephone, telegraph, radio and broadcasting services] started early to use satellites in connection with communications between mainland Norway and the platforms on the oil fields in the North Sea and the connections between the mainland and Svalbard.

Giving Norway's commitment to ESA a higher priority will benefit the Norwegian industry to a large degree, since ESA practices the principle of so-called "fair return". This means that approximately 70 percent of the contributions will come back to Norway in the form of orders for high-technology goods and services.

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CSO: 3698/275

BIOTECHNOLOGY

BELGIAN ECO-BIO DEVELOPING MARKET STRATEGY

Zellik TECHNIVISIE in Dutch 18 Sep pp 1, 15-16

[Article by Guido Swillen: "Eco-Bio Introduces New Techniques in Diagnostic Microbiology"]

[Text] It is admirable how Eco-Bio, the manufacturer of in vitro diagnostic preparations located in Hasselt, has managed to become one of Europe's market leaders after only a few years. One of Eco-Bio pioneering new products will reduce the current very long 18-hour bacterial reaction time to a mere 15 seconds. This gain of time can be of a vital importance when dealing with some deadly diseases. Within 2 years Eco-Bio also wants to develop diagnostic DNA probe, i.e., detecting bacteria with a replicating technique. To do this the double DNA strand is untwisted to form a single one. Using a synthetic DNA probes with a flourescent or radioactive tag, the sought-after DNA particle can be found easily because it only pairs with its predestined synthetic counterpart!

Origin

The story of Eco-Bio (abbreviation of ECOlogy and BIOchemistry) began with General Manager Erik Briers' willpower. After receiving his doctorate in chemistry, he became involved in clinical biology by pure accident. He joined a clinical laboratory as head of the biochemical laboratory. Thus he got acquainted with the field from the customer's point of view. Next, he joined a French firm, a supplier of diagnostic preparations, where he was responsible for its scientific service in the Benelux. "I had been a customer first, now I was on the other side," he says. He found out who supplied the products, how distribution in Belgium was organized, etc. It appeared that Belgium imported more than 95 percent of its diagnostic preparations.

Drawing from his business experiences and having noticed Belgium's dependence, Erik Briers put forward a plan in May 1982 to set up his own firm for diagnostic preparations in Belgium. He contacted a financial group in Hasselt connected with his former employer. It provided the bulk of the initial capital of 10 million Belgian francs. Eco-Bio started production in October 1982. Commercial activity began in April 1983, and 1 year later the firm had already conquered 40 percent or so of the Belgian market for microbiological diagnostic preparations, thanks to its ability to provide quality and fast

service at an acceptable price. At the end of 1983, its capital was increased to 30 million Belgian francs to cover expansion costs and investments. The 1984 turnover amounted to 14.5 million Belgian francs, and for this year a turnover of approximately 25 million Belgian francs is anticipated.

Diagnostic Prepartions

Diagnostic preparations are used in clinical or industrial laboratories to diagnose medical or hygienic problems. A clinical laboratory, for instance, no longer makes the reagents which identify glucose in urine but buys a glucose diagnostic kit from a firm specializing in diagnostics.

The Belgian market for diagnostic preparations amounts to roughly 1.5 billion francs, and it is expanding each year. It consists of four segments: biochemical diagnostic preparations to determinie biochemical parameters, for instance glucose in blood; hematological diagnostic preparations to determine the cellular composition of blood; the RIA (radioimmunoassay) diagnostic preparations to identify very small concentrations (e.g., hormones). These three market segments are very highly automated, and the products have maximum efficiency and are sold at minimum prices.

"It requires a lot of capital to penetrate these parts of the market, to win a good market position from the outset, something that was impossible for Eco-Bio," as Erik Briers puts it. "But Eco-Bio had every chance to succeed in the fourth market segment, diagnostic preparations for bacteriology, a market worth 200 to 300 million Belgian francs in Belgium. However, Eco-Bio operates in a subsection, microbiology and immunology, worth about 50 million francs." In this sector the same techniques used in Pasteur's days (1890) are still in use today.

This is why the most important scientific and technical progress has been achieved recently in this market segment. Briers stresses that his firm is now on the same level as big foreign competitors.

Eco-Bio's Products

The firm's basic diagnostic products are blood and its derivatives, e.g., defibrinated horse and sheep blood and egg yolk. The ready-to-use products include petri dishes and disposable bottles and tubes. At the same time colorants, reagents and additives (antibiotic and enrichment mixes, as well as sterile solutions) are manufactured. These preparations are used in hospitals and clinical laboratories to detect pathogenic germs. To prevent diseases in hospitals, the sterility of materials and of special examination treatment areas is checked by means of diagnostic preparations. They are used in clinical laboratories to detect and isolate germs, and to look for an efficient antibiotic to contain the disease as quickly as possible.

In the pharmaceutical industry too diagnostic preparations are used to determine whether the outgoing product contains any germs. Diagnostic preparations are put into service in the cosmetic and food industries as well

to make sure the products do not contain microorganisms that may be harmful to human beings.

Strategy

"With the previously-mentioned, relatively simple diagnostic preparations Eco-Bio has made its name and quality well known. Now the firm has embarked upon the second stage, namely the manufacture of more sophisticated products," maintains Briers. Thanks to KB [Royal Decree] 123 three researchers have been hired to develop new products in cooperation with the universities. Already this year new diagnostic preparations will be commercialized, two of which are completely new. By the way, Erik Briers is proud to have 7 university graduates among Eco-Bio's 19 employees. One new product the firm is working on has a potential European market of 200 to 300 million Belgian francs. Eco-Bio would like to capture about 10 percent of that market within 3 to 4 years. This is one of the reasons, along with the growing activities in the field of classic diagnostic preparations, for the recent capital increase of 17 million francs. Thus, the capital now amounts to 47 million francs. Ten million francs has been injected by Advent's venture capital fund; the other 7 million by the old, and a few new, shareholders. This capital increase is also the result of the decision made by Eco-Bio's stockholders at a general meeting to buy a new building with new equipment.

In the third stage Eco-Bio wants to start its own R&D. The IWONL [Institute for Scientific Research in Industry and Agriculture] has already accepted a project for which an additional two employees will be engaged. The goal will be to gather know-how in the use of monoclonal techniques in the manufacturer of diagnostic preparations. By the end of this year, then, the staff will have risen to 21 employees.

Evolution of Diagnostic Preparations

To this day bacteria are still detected through their metabolic processes. Thus, bacteria which convert glucose to gluconic acid acidify the culture medium in which they multiply. However, it is necessary to have a concentration of 10^9 bacteria to detect this acidification! To obtain this you take several million bacteria and let them grow in a culture medium. Every 30 minutes their number doubles, and after 18 hours, there are sufficient to ascertain whether or not acidification has taken place. "That takes time, and we cannot spare it today, because for some deadly infections this classic procedure takes too much time," claims Briers.

One new Eco-Bio product will reduce this reaction time for Staphylococcus aureus for 18 hours to 15 seconds! This drastic saving of time is attained by tackling the problem -- i.e., identifying this kind of bacteria -- from a morphological point of view. The membrane of Staphylococcus aureus contains specific membrane proteins able to pair with fibrinogen. Eco-Bio is currently developing a test with diagnostic preparations to detect Staphylococcus aureus using this method.

Within 2 years Eco-Bio plans to develop diagnostic DNA, probes, i.e., detecting bacteria via a replicating technique. The principle is based on the knowledge that the helical, complementary DNA strands possess a common particle for each bacteria "group." The double DNA helix is untwisted to form a single strand. By means of a synthetic DNA probe with a flourescent or radioactive tag, the DNA particle we are looking for can easily be detected because it only bonds with its presdestined synthetic counterpart!

In Erik Brier's opinion it will be possible in a few years from now to diagnose the cause of disease within 2 hours. Moreover, diagnostic DNA probes will enable us to detect all bacteria of a particular species with a 100 percent certainty. The error margin of present-day methods is about 2 to 15 percent.

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CSO: 3698/1001-A

BIOTECHNOLOGY

BRIEFS

INDUSTRIAL ENZYME PRODUCTION--Labofina and Oleofina, both fully-owned subsidiaries of the Belgian oil group Petrofina, have signed a cooperation agreement with the U.S. company Chiron concerning the development of production processes for some industrial enzymes. These enzymes will be produced by fermentation from genetically-engineered microorganisms. Chiron, in Emeryville (California), is one of these companies born of venture capital that specialized in genetic engineering. [Text] [Paris LA TRIBUNE DE L'ECONOMIE in French 8 Jan 86 p 16] 9294

CSO: 3698/267

CIVIL AVIATION

AEROSPATIALE OF FRANCE ANNOUNCES RESEARCH ON 'SUPER-CONCORDE'

Paris LE NOUVEL ECONOMISTE in French 17 Jan 86 pp 62-63

[Article by Jean-Francois Jacquier: "Aerospatiale's Poker Hand"]

[Text] After the Concorde, the Super-Concorde. Aerospatiale now feels ready to accept the challenge of a second generation supersonic plane. Strengthened by the experience of the French-English Concorde, which has been in service for ten years, company officials believe they can repeat the technologic feat without repeating the financial disaster. While a new project in this field seemed to be buried for a long time almost everywhere, the Toulouse engineers have in hand a study that is sufficiently advanced to indicate the "technical and economic viability" of a Super-Concorde for the year 2000. Examined in the light of various economic scenarios, the project would actually be a sophisticated variant of the Concorde. Paradoxically, the Super-Concorde would not fly any faster than its predecessor, which means Mach 2.2; on the other hand, thanks to the intensive use of new materials such as carbon and titanium, to the application of generalized active control (CAG) which constantly calculates flight configurations, and to improved propulsion and a wingspan area increased from 500 to 640 square meters, the other performances of the plane could be seriously improved. Two versions are being considered: a more advanced one, which could transport 200 passengers for 8000 kilometers, and another, with 250 passengers for 10,000 kilometers. In both cases, a crew of two (pilot and copilot) instead of the present three, would be sufficient to fly the Super-Concorde.

The study was carried out by Aerospatiale in the greatest secret; its credibility remains to be established. The project initiators have no doubts: "Super-Concorde is a well defined airplane, already tested in the wind tunnel, calculated and designed with a high level of confidence." Nothing however has been said about market evaluation and the amount of investment required. It does not seem to have yet reached this stage.

Adventure

Civil Aviation is skeptical. Michel Lagorce, director of the civilian Aeronautique and former leader of the Concorde program, believes that "the key to the problem lies in the development of new jets" known as "variable cycle" ones. Jets that would operate differently depending on whether the plane flies at subsonic or supersonic speeds, and that would allow Super-Concorde to be a combination plane: supersonic over the ocean, it would become a conventional and fuel-sparing jet above land. One of the great weaknesses of the Concorde, which was designed long before the first oil crisis, is that it consumes four times more kerosene than a Boeing 747, while transporting four times fewer passengers. Conceiving a new supersonic plane without new engines is out the question. "And while our engineers know how to make variable cycle jet engines on paper, the development of these engines would require such investments that no manufacturer would be willing to enter into such an adventure," states Mr Lagorce.

Is the Super-Concorde then a bluff? Is it an operation meant to sustain the morale of a research department? Actually, Aerospatiale considers its plane as a solid basis for discussions capable of interesting other partners. In veiled terms, the message of the national company could mean: "We are offering the body and systems of a second generation supersonic plane to anyone who wants to join us in the development of its engines."

On the eve of the festivities organized by Air France on 21 January in New York, to mark the tenth anniversary of Concorde service, the question was whether Henri Martre, president of Aerospatiale, would be authorized by the government to "launch on American soil, an appeal to international cooperation."

For several reasons, Aerospatiale's officials seem to run into the government's reticence. First of all, there is the risk of annoying England by not bringing it into the initiative, and especially by breaking the news on American soil; France would thus clearly indicate its preference for a transatlantic cooperation. With negotiations for Westland's purchase at full steam, and a few days away from the inauguration of the tunnel under the Channel, the time is hardly auspicious. Secondly, with legislative elections coming up, no minister wants to assume the responsibility of mentioning the Concorde's successor. Just the name of the supersonic plane is enough to make the politicians uneasy; it reminds them too strongly of the financial abyss which they opened for the taxpayers on both sides of the Channel. It has been a historic disaster whose last official estimate, in 1982, amounts to 34 billion francs; a pit so huge that the figure has never been updated since.

Understanding

British Airways and Air France, the only companies using the supersonic plane, show benefits from its operation since 1982 and 1983: 80 million francs for Air France in 1985, and 12 million pounds for British Airways. But we must clearly understand that this does not take into account amortization and financial costs.

With the previous deficits, the total bill of the plane can be estimated today at 45 billion francs, which is equivalent to 10 nuclear submarines, or three Hermes space shuttles, or four 1300 megawatt nuclear power plants.

It is true that it would be even more expensive to keep the planes on the ground. And although they cannot be estimated, the spinoffs from the supersonic plane are not negligible. The Concorde program for instance, introduced the first numerical control machines in France; without the Concorde, Airbus and the Hermes project would probably have never seen the light of day; the Concorde has provided work for 200,000 people for 10 years; considerable progress was made in alloys, and 1000 subcontractors acquired unexpected technologies. Not to mention, maybe tomorrow, a profitable Super-Concorde!

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CIVIL AVIATION

BRIEFS

AIRBUS SUBCONTRACT TO SPAIN--SFENA and the Spanish National Electronics and Systems Company (INISEL) have signed a cooperation agreement concerning the CFDS (Central Fault Display System) that will equip the Airbus A.320. This is the first agreement signed at this level with a Spanish equipment manufacturer. The Spanish partner will be responsible for 35 percent of the development and manufacture of the CFDS. The part of the system entrusted to INISEL has to do with engineering and manufacture. The CFDS, a veritable "head monitor" for all aircraft systems, will also enable ground-maintenance personnel to locate faults. [Text] [Paris ELECTRONIQUE ACTUALITES in French 29 Nov 85 p 16] 9294

CSO: 3698/265

COMPUTERS

DETAILS ON FRG 'STARLET,' EUROPEAN OPTICAL COMPUTER WORK

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German
8 Nov 85 p 4

[Article by Michael Wett: "The Electronics Age Has Just Begun--The Next Generation: Optical and Biocomputers"]

[Excerpts] A new chapter is being written in the relatively young history of computer technology: classical data processing is being gradually replaced by knowledge processing; the optical computer will replace the electronic computer. Optical computers operate with photons instead of electrons, with light instead of power. New equipment items jump directly from processing speeds in the nanosecond range to processing speeds in the picosecond range. The leap into the rapid light beam era will change many things. Knowledge-based systems, so-called expert systems, which intelligently meld information, interpret it, and can draw logical conclusions from it are already being applied today; they are the advanced guard of the new computer era: the fifth generation.

Development of the optical computer has received a new dimension since the American Defense Department is considering employing this new computer generation product for the SDI project (Strategic Defense Initiative). In the United States, the Defense Department has set aside $1 billion for the "strategic computing" project. Japan endowed research having to do with the "fifth-generation computer" with $20 million. For Europe, the European Community Commission inaugurated a cross-border amalgamation of research institutes and universities in 1984. The project is entitled EJOB (European Joint Optical Bistability). In the Federal Republic, DM 84 million have been made available for the "optical computer" project.

Vector Machine With Pipeline Processor

A new path is being indicated by the "Starlet" computer. On the basis of gallium arsenate electronics, equipped with new computer configurations and languages, the processing of knowledge is to be facilitated in future in addition to data processing. "Starlet" was developed not in the United States or in Japan, but by a team of researchers from the Berlin Society for Mathematics and Data Processing (GMD), together with the Technical University of Berlin. The "Starlet" computer for the first time employs the principle of SIMD

(Single Instruction Multiple Data) pipeline processing. SIMD architecture means: a vector-form quantity of data is processed with a single command.

In 1984 the EG Commission initiated a cross-border amalgamation of 19 scientific working groups at 18 universities and research institutes. The goal of the EJOB program, which is limited to 2 years, is a development of the optical computer. It operates with photons instead of electrons. In the Federal Republic, the project is participated in by the Max-Planck Institute for Solid Physics in Stuttgart, as well as Frankfurt University and the Frauenhof Institute for Physical Measurement in Freiburg. The center for the research project is the University of Edinburgh, which is the research base of Desmond Smith, the inventor of the transphasor. He and his Scottish research team were the ones who were able to persuade the EG Commission to take up the EJOB project as an all-European activity.

The EJOB project is only financed through 1.8 million European billing units (ECU) by the European Community and is, therefore, not to be compared to research funding in the United States or in Japan.

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CSO: 3698/260

COMPUTERS

GMD EXPERT SYSTEM RESEARCH GROUP SEEKS TO APPLY RESULTS

Munich COMPUTERWOCHE in German 8 Nov 85 p 48

[Article: "Expert Systems Seek Practical Applications"]

[Text] Questions of technology transfer have taken on increasing weight in large-scale research facilities. This, for example, has found expression in the establishment of a separate institute for this problem in the Society for Mathematics and Data Processing (GMD) at St Augustin. The Research Group for Expert Systems in the Institute of Applied Information Technology of the GMD is dealing with this question.

In the area of expert systems, applications areas exist today in which the status of the equipment has outgrown the laboratory presence. In other cases, research has not progressed to the point that it can offer certain solutions. Consequently, potential users will find it essential to carefully consider the decision to create an expert system, according to GMD collaborators.

The Research Group for Expert Systems (XPS) at the GMD has set itself the goal of seeing to it that expert systems make a broad breakthrough in practical applications and improving their methods and technical foundations. This happens, on the one hand, through the capture of results from the academic area, through supplementing with its own research and through carrying over these criteria into practical applications; on the other hand, this also occurs through identification of new problems in real application and as a result of their introduction into new research activities.

An example from the work of the research group is the "Babylon" tool system. The tool creates an integrated work environment for the knowledge engineer who must bring the know-how of the experts into a form which is intelligible to the system. Furthermore, it offers a choice of the most important forms of knowledge representation: object-oriented presentations, rule-oriented presentations, and logic-oriented presentations.

These presentation forms can be freely selected in the "Babylon" system and can be combined. They are intended to permit the knowledge engineer to formalize the knowledge developed by the experts and to structure it and, thus, make it available to the data processing system. Various types of knowledge, say, factual, strategic, or associative knowledge, can, thus, be represented

through appropriate formalisms. This, according to the GMD experts, reduces the structural difference between the problem-solving conduct of the expert and the system; furthermore, the development of expert systems is accelerated. All tools are accessible via a uniform user interface, which can be equipped with windows, menus, as well as graphics capabilities.

A second focal point of the activities of the research group is represented by the DEX-C3 expert system to diagnose defects in automatic transmissions of automobiles. The product was developed upon the orders of and in cooperation with Ford of Europe for type C-3 transmissions.

The collaborators of the research group place special value upon the fact that their work does not take place around a "green-covered table." Together with industrial partners they also collect practical experiences in the construction and employment of expert systems.

The GMD experts see a broad potential spectrum of applications in production technology, in maintenance and distribution, in process control, or facility monitoring, as well as in planning and designing work. Banks and insurance companies are also having thoughts with regard to the employment of expert systems. There, for example, a broad application spectrum is visualized for consultation transactions. However, the coin still has an obverse side: primarily, there is a shortage of knowledge engineers who are capable of developing such knowledge-processing systems. The broad breakthrough toward success is likely to still be some time away, as the GMD collaborators concede.

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COMPUTERS

BRIEFS

NORWAY GETS SUPERCOMPUTER--Trondheim. Everything is ready for Trondheim to become the country's leading computer center. Before the end of the year the research center in the city will probably get the country's largest supercomputer. The computer will, for instance, have twice the capacity of the data equipment being put in use at the IBM-installation which will be connected to the University in Bergen. Trondheim already has Northern Europe's best equipped data communications network, and the computer can therefore be used by research and technology centers all across the country. "After lengthy evaluation work it is clear that the supercomputer which will be installed in Trondheim for use by Norwegian research, teaching and industry will come from the American CRAY company (model CRAY X-MP/22). A tentative purchase order has been sent subject to the government's final green signal. The final contract will be signed in February, and the installation will take place in November. By the end of the year the installation will be approved and fully operational," says director Karl G. Schjetne from the Computer Center at the University of Trondheim (RUNIT) during a press conference at the computer fair DATA-TEKNIKK 86 in Trondheim yesterday. The fair is the largest computer fair which has been arranged in Norway, and it is arranged in connection with the Study Program at NTH [Norwegian Technical University]. It lasts the whole week and has 85 exhibitors. The supercomputer which will be used in Trondheim will cost between 70 and 80 million kroner. CRAY is currently the leading supplier of supercomputers worldwide with over 100 installations of a total of approximately 150 supercomputer installations in the world today. It is NTH, SINTEF [Foundation for Technical and Industrial Research at the University of Trondheim], NTNF [Royal Norwegian Council for Scientific and Industrial Research], NAVF [Norwegian Research Council for Science and the Humanities] which together with Statoil and Norsk Hydro take care of the acquisition and purchase of the supercomputer. The four share the cost with one quarter coming from SINTEF and NTH, one quarter from NTNF, one quarter from NAVH and one quarter from Statoil and Norsk Hydro. The computer will be installed in facilities for the central data installation at Lerkendal, South of Gloshaugen where NTH and SINTEF are located. During the presentation of the computer's possibilities and use it was stressed that it will be of particularly great use for a number of important projects in the area of oil activities as, for instance, geology, geophysics, reservoir technology and volume calculations. "For a number of research areas this will open a completely new world. The computing power and possibilities of the computer are enormous compared with those we have today." [Text] [Oslo AFTENPOSTEN in Norwegian 7 Jan 86 p 80] 12831

CSO: 3698/275

FACTORY AUTOMATION

ITALIAN MARKET FOR CAD/CAM SYSTEMS EXPANDING

Milan INFORMATICA 70 in Italian Oct 85 p 19

[Text] According to an analysis by Reseau, by the end of 1984 there were about 1,900 CAD/CAM work stations in place in Italy in the major areas of application. Relative to 1982 this field has reportedly, therefore, increased by 260 percent and with a speed decisively greater than that forecasted only 2 years ago. This is what emerges out of a wide multicustomer market survey conducted by mail in 1984 on the basis of 320 questionnaires completed by actual and potential CAD/CAM users, and from the analysis of data from 30 leading companies which provide systems, hardware, software, and services. This sample represents 32 percent of the total installations (the users) and 75 percent of the manufacturers of CAD/CAM in Italy (the suppliers).

Among the most important results surfacing from this survey one should point out: the high frequency of work stations with autonomous computational capabilities, equal to about 28 percent today and with a trend to grow up to about 40 percent by 1987; the frequency of systems based on personal computers estimated at about 15-20 percent of the total systems and characterized by high rate of growth similar to its present growth at the international level; and finally, the confirmation of the importance of multiterminal systems of value greater than 150 million lire--both of the host and dedicated type--to which are connected more than 50 percent of the operating CAD/CAM work stations and which, in terms of value, will continue to represent the major share of the market.

In the aggregate, the mix of traditional and new configurations available in the market has markedly lowered the average investment per CAD/CAM work station, an investment which today is very near 100 million lire, with a spread that goes from 40-50 million lire for the simplest applications to 200 million lire per station for the more complex applications.

Expansion of the potential market to sectors of industry which were until now outside the applications of these new technologies is the reason for the present large increase. Technical enterprises under 50 employees, but even medium-small companies with 50 to 500 employees, which in 1982 didn't represent more than 40 percent of the CAD/CAM users, will constitute

more than 80 percent of the expected users during the period 1985-90. The market surveys indicate a decisive recovery from the slowdown that Italy had been suffering relative to the rest of the world and to the major European countries.

In 1984, the entire Italian CAD/CAM market including systems, work stations, software and services, and peripherals for input, can be valued at 130 billion lire, which is about 9.1 percent of the European market, compared to the 7.7 percent in 1982.

The traditional mechanical and electrical sectors applications still constitute the major share of the CAD/CAM market both in terms of installed work stations (54 percent in 1984 versus 59 percent in 1982) and in terms of money value (68 percent in 1984). Increasing significantly is, nevertheless, the money spent in CAD/CAM systems by diverse industries among which the textile industry, clothing manufacturers, furniture and furnishings industry, delivery services, etc... The forecasts for the next 5 years are very positive and indicate for the Italian market a rate of increase slightly higher than the average for Europe. In fact, only 4-5 percent of the potential market has been exploited and no symptoms of market saturation are expected before 1990.

The overall supply in Italy appears less concentrated than in other countries, because of a long list of small system companies and software houses which are very dynamic in the field. The portion of the market attributed to companies of Italian capital totals 20-22 percent, of which 10-12 percent are shared by Selenia Autotrol, Cad Lab, Eurobit, and Olivetti Tecnost.

A review of the principal CAD/CAM work stations and application software packages available on the market completes the market research results, available in a report for the suppliers and another report for the users or potential users of CAD/CAM.

(See Figure on following page)

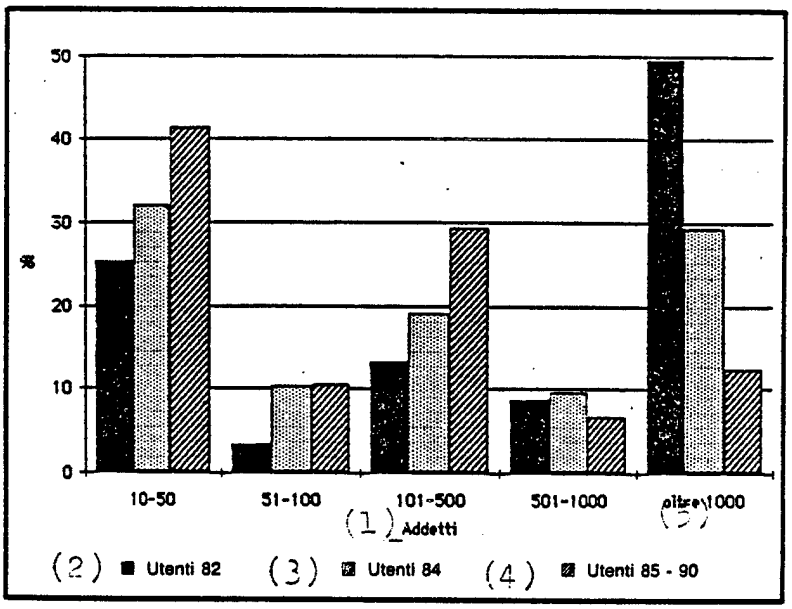

Figure 1. The histogram indicates the percentage of CAD/CAM users (from the surveyed sample) by company size.

Key:

1. Employees
2. Users 82
3. Users 84
4. Users 85-90
5. Over 100

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CSO: 3698/246

FACTORY AUTOMATION

UK FIRM TO INTEGRATE MAP INTO FACTORY AUTOMATION CONCEPT

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German
13 Jan 86 p 7

Article by re.: "MAP Program to be Integrated at CIM Levels"

Text Within the framework of its concept of computer-supported manufacturing systems (CIM), the computer enterprise ICL intends to include the level of industrial control through the MAP program developed by General Motors. In the opinion of ICL Deutschland International Computers GmbH, Nuremberg, the systems used so far in industry almost always work isolated from each other and must be connected to each other for a superordinate, integrated concept of production control. The enterprise is of the opinion that this task is so complex that no one producer alone is in a position to supply all equipment and all computer programs from the supercomputer to the production robot. Communications standards are needed in order to link up different systems.

In its production control concept, ICL subdivides the operational area of its factory into four levels. On the first level, the processing equipment is controlled directly and at every step of the manufacturing process. On the second level, groups of machines are operationally controlled by a cellular computer system. The third level deals with optimizing planning and distribution of resources, and the fourth level organizes strategic planning and supplies information for drafting and production procedures.

In the opinion of ICL, the General Motors MAP program in its present version permits an equal and hierarchical cooperation between systems at the CIM levels two to four of the ICL concept. For the data grid in the MAP program a wide band token bus connection was selected which exists as IEEE 802.4 standard and, according to ICL, is presently being established as the international ISO standard. This standard is already supported in the United States by over 50 computer manufacturers and production enterprises; among them are Ford, Chrysler, McDonnel Douglas, Boeing, Kodak and Du Pont. In Europe, Volvo, Fiat, Renault, ICI and British Petroleum have decided to use this program.

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CSO: 3698/279

MICROELECTRONICS

LEP OF FRANCE PRESENTS WORK IN GALLIUM ARSENIDE

Paris ELECTRONIQUE ACTUALITES in French 29 Nov 85 p 23

[Article: "At the 72nd Physics Show, the LEP Presents a Microwave-Frequency HEMT--2.3 dB of Noise at 12 GHz--Obtained by Organo-Metallic Vapor-Phase Epitaxy"]

[Excerpts] At the 72nd Physics Show, to be held in Paris, Porte de Versailles, on 2-6 December, the Electronics and Applied Physics Laboratory will present its most recent developments in the field of microwave-frequency and digital GaAs transistors and integrated circuits.

For instance, using atmospheric-pressure organo-metallic vapor-phase epitaxy (EPV-OM), the LEP has developed $Ga_{0.7}Al_{0.3}As$-GaAs HEMT transistors (also called TEGFETs) with a gate size of 0.8 micron, characterized by a noise level of 2.3 dB at 12 GHz with an associated gain of 6.2 dB. These results, obtained on non-optimized components, seem to indicate that the performance characteristics of HEMTs obtained through organo-metallic vapor-phase epitaxy will tend to match those of HEMTs produced by molecular-jet epitaxy.

The LEP also used organo-metallic vapor-phase epitaxy to produce experimental GaInAs/InP PIN photodiodes with a leakage current of the order of 1 nA, a very low junction capacitance (0.4 pF) for a reverse voltage of -10 V, and a quantum efficiency exceeding 60 percent at 1.3 and 1.55 microns.

Coupled with a GaAs field-effect transistor, this PIN photodiode, one of the first obtained through the atmospheric-pressure organo-metallic vapor-phase epitaxy technique, should find an application in receiving modules for fiber transmission.

Still in the field of microwave frequencies, the LEP also produced an experimental monolithic GaAs distributed amplifier characterized by a gain of 5.7 +_0.6 dB in the 2-18-GHz band, with a standing-wave rate of less than 2.2.

This monolithic amplifier consists of four transistors with a gate-length of 0.5 micron and a width of 200 microns (four 50-micron fingers), MIM (metal-insulator-metal) capacitors, integrated resistors and metallized holes required to ground certain parts of the circuit. The amplifier, fully self-

controlled since it contains the bias-voltage circuits, is integrated on a 2.8 x 2.3 mm^2 chip.

In the digital field, still using gallium arsenide, the LEP presents not only the 1-K SRAM with a 3-ns access time and a 90-mW power consumption and the high-speed 2-bit analog-to-digital converter which were already described in our columns (respectively in the 13 and 27 September 1985 issues of ELECTRONIQUE ACTUALITES), but also an HCMOS-compatible programmable dynamic frequency divider by 60/61.

This experimental circuit, obtained through aligned 1-micron recessed-gate technology, operates at a maximum frequency of 1.2 GHz for an intrinsic power consumption of 8 mW (18 mW with the input/output interfaces).

The circuit, which uses enrichment-mode transistors (pinch-off voltage V_T = 50 mV) in the logic (DCFL) and control (switches) stages, hinges around a programmable dynamic divider by 5/6 which is synchronized by a generator of complementary clocks. A static divider by 12 pilots the control logic of the divider by 5/6. The full circuit (125 components) takes up a total area of 0.3 mm^2.

Designed for applications involving the synthesis of frequencies spaced 25 kHz apart, it is characterized by a minimum phase noise of -124 dBc/Hz, which is quite comparable to that of a silicon divider.

9294
CSO: 3698/265

MICROELECTRONICS

SIEMENS OFFICIAL RESPONDS TO 'MEGAPROJECT' CRITICISM

Duesseldorf HANDELSBLATT in German 17 Dec 85 p 15

[Article by Josef Hess: "With Respect to Megachips Siemens Expects To Catch Up With the Japanese by 1990 With Financial Help From Bonn"; first paragraph is HANDELSBLATT introduction]

[Text] In order to catch up in microelectronics in comparison with the leading Japanese and to reach equal status, Philips and Siemens are cooperating in the development of new still higher capacity chips. The governments of the Federal Republic and the Netherlands are planning to support the DM 1.4 billion FuE activities, which are likely to trigger investments of DM 1 billion in the Federal Republic and DM 500 million in Holland, with state (wasted) subsidies of DM 320 million or DM 160 million (see HANDELSBLATT, 7/8 December 1985). Against the background of great liquidity and high yield at Siemens--the electronics giant is being called a "quasi-bank" and has raised its dividends 2 years in succession--the decision by the Bonn government met, in part, with some public criticism. In a conversation with HANDELSBLATT, the chief of the research and technology area of the Siemens Corp., Prof Karl Heinz Beckurts, commented on this criticism.

The fact that development takes place in Munich and fabrication in Hamburg and Regensburg instead of perhaps in California or Scotland, as well as the fact that the results of development are applied in Europe, is at the disposal of technology in Europe, or rather in the Federal Republic. This is largely a matter of creating a high-tech infrastructure in the Federal Republic or in Europe. Political purism would not carry the day.

Naturally, even state research sponsorship must be aware of its limitations and must, for example, limit itself to very clear goals. For instance, 2 years in succession Siemens has stated that it does not wish to apply for subsidies for small research projects. Neither is the indirect research subsidy, enjoyed within the framework of various programs by middle-size enterprises, an "essential instrument." Yet, on the other hand, the political claim that no direct research subsidies should be made at all is in error in view of the great challenges which exist for Europe in the 1990's.

In the meantime, this challenge has become a tremendous task for the Siemens Corp. After all, the Japanese have already achieved a huge time lead in chip development.

Critics claim that Siemens will come out next year with a newly developed 256-kbit memory and would thus be limping 3.5 years behind the Japanese. Beckurts admits specifically that "we are late with the 256 kbit." But he believes that the catch-up race will be successful, particularly since two programs are running parallel at this time: for the development of a dynamic 1-Mbit chip Siemens has concluded a cooperation agreement with the Japanese Toshiba Enterprise. Late by comparison to the fastest Japanese enterprises, but nevertheless in 1986, the first test samples will be marketed and then in 1987 mass production will be available. This program is said to run on its own strength and without any public subsidy.

State-subsidized development of the 4-Mbit chip is said to be completely independent of this program. The 4-Mbit chip is intended to be marketed at least at the same time as a comparable Japanese product: in 1988 as far as sample production is concerned and in 1989 as far as mass production is concerned. Nevertheless, Siemens has now received a "shot in the arm." In "research and technology" alone, several hundred engineers and natural scientists have now been hired.

At Munich-Perlach many hundreds of millions of DM have been spent on new development laboratories. A detailed planned development program is under way whose target dates are constantly checked. Where necessary, detail development is also undertaken with varying problem-solving sessions running parallel in order to save time. In Perlach, development is going on for 14 hours a day already and a 24-hour-a-day laboratory operation is being promoted.

On the other hand, it is not possible to arbitrarily force the development rate because with respect to chip development each new suggestion must be worked out in a multiplicity of processing steps before it can be tested. Such a cycle typically takes 2 months. One needs a whole series of such cycles in order to bring a development to certain success.

Beckurts believes that the competition with the Japanese in chip development will continue. Nevertheless, he thinks that the use of Siemens for the development of the megabit memory already exceeds that which the Japanese spend and that, consequently, it is possible to catch up with the Japanese head start. Wishful thinking or justified optimism, that is the question.

It is known that in the competition relationship between oligopolists--and there is no doubt that we are dealing with this type--there is action as well as reaction. Japanese and Americans will probably not remain idle in view of the concentrated action of Siemens, Philips, and of both of the governments involved.

According to Beckurts, Siemens does not have false pride in research policy calling for it to do everything itself, particularly since, as a generalist, one repeatedly has to compete against specialists who have a head start in their specialty. This is true, for example, of small market-aggressive high-tech firms working in the area of computer-aided design (CAD) or in certain software development.

This is why there is always testing going on as to whether one should not "in certain peripheral areas" purchase technologies or undertake development in partnership with others. "What is important is that we energetically take up certain key technologies which are important to the entire enterprise ourselves, and these include microelectronics." Such an enterprise policy has become urgent not only because of possible high-price policies implemented by Americans and Japanese, but, primarily, because of a threatening embargo policy on the part of the competition. For example, Japan is no longer delivering certain components for solid-state lasers today.

On the other hand, Siemens successfully uses some synergy effects. The fact that within the concern one understands something about communications equipment, regulation equipment, as well as energy equipment, the fact that we are multisided and can use knowledge beyond the borders of individual disciplines, is an advantage which the generalist Siemens Enterprise has over competing specialists and can throw it onto the scale. Furthermore, the know-how transfer between enterprises is functioning well and it is part of the responsibility of the research and technology area to see to such exchanges. Many an instrument is available for such a knowledge transfer.

Finally, Beckurts commented on the suspicion that Siemens was getting above-average subsidies for research from the state. The fact is that small and middle-size enterprises today account for about 13 percent of the expenses involved in the Federal German economy, but receive 31 percent of the subsidies from the state. Siemens, on the other hand, accounts for 10 percent of the expenses and also receives 10 percent of public subsidy payments. The appropriate promotion of smaller and middle-size enterprises is good and proper. Only the numerical ratio contradicts the subordination. Large-scale enterprises are taken care of in an extraproportional manner at the expense of the small ones. Siemens can point to a number of examples in which public institutions and universities have profited from subsidies made by the concern--primarily within the framework of cooperative agreements.

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CSO: 3698/259

MICROELECTRONICS

BRIEFS

EUROPEAN LABORATORY SUCCESS--The development of supercomputers capable of carrying out several billion instructions per second inevitably involves the application of new technologies, particularly that based on gallium arsenide (GaAs). With that in mind, pursuing their efforts in digital components, the Electronics and Applied Physics Laboratories (LEP) have developed a static RAM [Random Access Memory] of 1 kilobit with a 3-nanosecond access time. This memory, developed in the so-called Direct Coupled FET logic [DCFL], comprises a 1,024-dot memory matrix, arranged in 32 rows and 32 columns. With 3-micron wide lines, it was possible to integrate 4,979 transistors and 2,324 resistors on a 6.25 mm^2 surface. To assure a 2 to 3 nanosecond access time to read the command, it was necessary to reduce the surface of the memory dot. On the other hand, to optimize the product speed/consumption, the memory uses two different serviceable voltages: The first is 1.3 volts for the memory dot matrix and the peripheral circuits, and the second is 2.3 volts for the operational amplifiers. Researchers have already tested this lekilobit memory with a card with points especially developed for hyperfrequency measurements. In spite of satisfactory performance, there is, for the time being, no question of industrial production. [Text] [Paris L'USINE NOUVELLE in French 12 Dec 85 p 74] 25027/12624

FRANCE-UK JOINT IC PROGRAM-- The British company General Electric Company--GEC Plc--and Thomson SA have signed a draft agreement for the implementation of a five-year program to develop design and production tools for specific high-performance integrated circuits. The agreement was signed by GEC through its fully-owned subsidiary Marconi Electronic Devices Ltd of Lincoln (United Kingdom) and Thomson SA through its Thomson Semiconductors subsidiary in Paris. Together with other strategic themes covered by similar cooperation projects of the two groups, in particular in the field of power semiconductors, the program was submitted to Eureka project officials with a view to obtaining partial financing. [Text] [Paris LA TRIBUNE DE L'ECONOMIE in French 9 Jan 86 p 17] 9294

SIEMENS INVESTS IN SPAIN--Hans-Gerd Neglein, Siemens vice-chairman, yesterday signed an agreement with the Spanish minister of industry, Joan Majo, whereby the German company commits itself to invest 10 billion pesetas (500 million francs) in Spain's electronics and computer sector between 1986 and 1989, and to create 420 jobs. Beyond an easing of administrative formalities, the Spanish government offers no economic counterpart to Siemens. Siemens Spain (26.4 billion pesetas in revenues, 368 million in profits, 3222 employees), which concerned itself mainly with electrical equipment, now finds the need to orient itself toward advanced technologies: "Nothing can replace an electric motor," a company spokesperson points out, "but we must modernize its fabrication if we want to meet the demands of the market." The agreement thus stipulates 1 billion pesetas for the robotized automation of the Cornella motor plant (Barcelona). In addition, Siemens will spend 1.8 billion pesetas to build a computer research and development center (hardware and software) which will employ about 100 technologists. In 1989, electronics will form 62 percent of Siemens Spain's turnover, compared to 45 percent today. The exportation of these electronic products should reach 10 billion pesetas, compared to 1.5 billion. The German company does not intend to leave it at that: it now impatiently awaits the liberalization of telecommunications. [Text] [Paris LA TRIBUNE DE L'ECONOMIE in French 15 Jan 86 p 8] 11,023

CSO: 3698/276

SCIENTIFIC AND INDUSTRIAL POLICY

SWITZERLAND CONSIDERS EUREKA PROJECTS

Paris ZERO UN INFORMATIQUE HEBDO in French 18 Nov 86 p 65

[Article signed J.P.: "Eureka: First Participation of Switzerland"]

[Text] Switzerland will contribute to the implementation of the European research network.

The 10 projects selected in Hanover at the meeting on Eureka, where many European companies were represented, include the creation of a "European research network," that will benefit from the first active participation of Switzerland in this effort to develop advanced technologies.

That data-processing should receive priority in Switzerland is not very surprising, considering the recent statements made by Dr Urs Hochstrasser, director of the Federal Office for Education and Science, who expressed a determination "to bridge gaps and make up for lost time" in this field.

The network project was put forward by the CICUS (Data-Processing Commission of the Swiss Universities Conference) and in particular by the chairman of its network group, J. Harms, who as a matter of fact is looking for a successor to the EARN network (European Academic Research Net) made available by IBM, but only until the end of 1988.

To meet scientists' requirements, the network will essentially have to offer very fast transmission so that results could be obtained rapidly and remotely without having to use the unavoidable magnetic tapes.

The Other Projects

But this first decision on development within the Eureka framework (whose financing also still remains to be determined) must not make us forget that many other data-processing projects were proposed and included in a list entitled "Extended List for National Representatives, Eureka, Projects Under Consideration in Switzerland," available from the Federal Office for Education and Science.

It includes, for instance, projects proposed on the initiative of the Swiss Electronics and Microtechnology Center of Neuchatel, which are based on

artificial intelligence and have to do with the checking of integrated circuits and with robotics.

Other developments were proposed by the Federal Technology Institute of Zurich, in fields such as multiprocessor architecture, optical computers, robotics, microprocessors for engineering, etc.

For its part, the Lausanne Polytechnic School is putting forward studies on automated office communications, multiprocessor systems, memories, the use of supercomputers, artificial intelligence for the development of new circuits, robotics, etc.

However, federal institutions are not the only ones who wish to participate in the rush toward high-technology data-processing products: many private companies, such as Faselec (Zurich), the Industrial Radioelectronics Company (Bern), Atek NC Systems (Brugg), Biocare (Basel), Landis & Gyr (Zug), Brown, Bovery and Co. (Baden), Hasler (Bern) and Contraves (Zurich) are also included in the above-mentioned list and are looking forward to participating in Eureka.

It will be interesting to see now how they will all go about obtaining credits. The Eureka label will certainly be in great demand, and not only from data-processing specialists.

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CSO; 3698/265

SCIENTIFIC AND INDUSTRIAL POLICY

UK, FRG ANNOUNCE EUREKA PROJECTS IN COMPUTERS, LASERS

UK Projects

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 23 Dec 85 p 7

[Text] A number of new projects for European establishments within the framework of the Eureka initiative were announced by British minister for industry and information technology, Geoffrey Pattie. The technical projects which are already under way or which are in an advanced stage of planning include the following:

a) computers in schools: the British Acorn, Olivetti (Italy), and Thomson (France) corporations are working on a project to employ microcomputers in school instruction;

b) microcircuits: European silicon chips are the goal which Robb Wilmot of the British ICL has set for a new pan-European microchip project;

c) broadband communication: the British Plessey Corp., together with CIT Alcatel (France) and Italtel (Italy), is working on this telecommunications project;

d) automated fabrication lines for integrated circuits: Cambridge Instruments and British Aerospace are working within the framework of this project together with Siemens and other German enterprises, as well as with the French Matra Enterprise;

e) integrated gallium arsenate circuits: British General Electric and Thomson (France) are developing proposals for their fabrication;

f) aviation and space flight technology: British Aerospace is discussing advanced technology projects with Messerschmitt-Boelkow-Blohm (MBB) and Aerospatiale (France), Aeritalia (Italy), and Casa (Spain).

At the second meeting of appropriate ministers from Eureka member countries Minister Pattie said that the start had been good. He said that the Eureka initiative was still in its beginning stages and would require voluminous detailed work in order to bear fruit. However, it seemed that the necessity for Eureka had been correctly identified.

In conjunction with the marketable character of the projects, the reaction of the European economies was said to be encouraging. Another important path by which the market demand could be successfully identified was said to be the establishment of industrial forums. Great Britain is said to have made a start with establishment of "Pensa" which deals with working out of overall standards for the configuration of communications systems. Another forum is devoted to discussion of dialogue systems for home computers.

Pan-European Laser Project

Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 15 Jan 86 p 29

[Text] The Federal Ministry for Research and Technology recently announced the first project for the European Eureka technology program which was agreed upon at the beginning of November during a conference of ministers in Hanover. In collaboration with France, Italy, and Great Britain, various types of lasers with a high beam capacity are to be developed for various types of industrial usages. Among others, this involves the construction of carbon dioxide lasers with a capacity of between 10 and 100 kw. In the meantime, however, instruments with a capacity of 20 kw have already come onto the market--a beam capacity which many experts consider to be adequate--so that this project appears to be somewhat questionable. Additional program points involved in the Eureka project involve the development of solid-state lasers with 1- to 5-kw capacities for material processing and of so-called excimer lasers which have an output of up to 10 kw. Of all these projects, the further development of the excimer laser seems to be most meaningful, since these instruments open up the difficult-to-access area of ultraviolet radiation. A small German enterprise has occupied the leading position in this area for a long time.

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SCIENTIFIC AND INDUSTRIAL POLICY

SPAIN TO PARTICIPATE IN EUREKA, ESA

Eureka Project

Madrid DIARIO 16 in Spanish 28 Jan 86 p 20

[Article by Tania Juanes]

[Text] Madrid--Some 27 billion pesetas will be spent on the five projects in which Spain will participate and which were approved at last week's London meeting of the countries involved in the Eureka program. In all, 16 projects were approved, combined with the 10 that were selected at the previous gathering in Hannover. Spain is involved in only one of the projects approved at that first "summit meeting."

Spain's average share in the 5 projects in which it will be involved is 23 percent, which is tantamount to an investment of some 6.3 billion pesetas. According to the general manager of Industrial and Technological Innovation, Florencio Ornia, who chaired the Spanish delegation, "one of the basic goals was for Spain not to have a less than 10 percent share in the projects in which it will participate, because otherwise it would risk being a third-class partner."

There would also be no assurance, he indicated, that Spain would share in or assimilate technologies or the support that the various governments involved in the Eureka program will give to the products or technologies that emerge from these projects through public purchases. "If Spain," he added, "accounts for 10 to 15 percent of the European market, we should not go below these percentages, with certain exceptions."

Robots

Among the approved projects is one aimed at developing third-generation mobile robots for industrial security. Construcciones Aeronauticas has a 13 percent share; Matra (France), 39 percent; Dornier (Germany), 31 percent, and CSEM (Switzerland), 13 percent. The complete project entails an investment of 100 million ECU's (European Currency Unit), which is equivalent to some 13 billion pesetas.

Also approved in London was a project involving Inisel (Spain), Eurosoft (France) and CESA (Italy), the commercial application of which is the modernization of plants that produce electronic systems. Total investment will come to 4 billion pesetas.

In addition, Sener has a 10 percent share in another project, in which its partners will be Dornier and Sondern. The project calls for the development of mobile neutron radiography equipment adapted to nondestructive industrial controls and testing. Another of the authorized projects is called Galeno 2000, in which Spain has a 40 percent share through ICSA-IDS. The commercial application is rapid, low-cost clinical analysis and diagnosis. The total budget is 7.365 billion pesetas.

Interest Among Businesses

According to Florencio Ornia, the Eureka program is arousing the interest of business in Spain and Europe alike. The companies that are or will soon be participating are generally the pacesetters in their sector and possess great technological capabilities. The nature of the program has much to do with its success, since it has avoided authorizing purely technological projects that are not industrially viable, as is the case with other European cooperation programs.

Most of the projects are in telecommunications, environmental technology, lasers, pharmaceuticals and information technology.

The London meeting also took up the composition of the secretariat. It will be made up of six members, three representing EEC member countries, two from non-EEC European nations and another from the European Commission, the EEC's executive body. A headquarters for the secretariat has not yet been selected; this was left up to the ministers' meeting this May or June. The leading candidates are Brussels and Strasbourg.

European Space Agency

Madrid EL PAIS in Spanish 7 Feb 86 p 46

[Text] Madrid—A consortium of Spanish firms, headed by the National Institute of Industry's electronics holding company, INISEL, and also including the companies Rymsa and Dielsa and the University of Santander, has just secured a 500 million peseta contract from the European Space Agency.

According to sources in the National Commission for Space Research (CONIE) and the Center for Technological and Industrial Development (CDTI), which helped in submitting the Spanish bid, the most important aspect of the contract "is not its economic component but the contribution of Spanish technology to a European project."

The contract calls for the construction of an earth station to conduct tests on the payload of the Olympus satellite. The project involves the development of technology in the field of millimeter waves, something that no European company has done as yet.

In addition, the CDTI will help finance a robotization project that the Saci company, which belongs to the Centunion group, has negotiated with the General Directorate of Electronics and Informatics under the Pauta plan. Saci produces series transformers (a wide variety of small gages attached to large machines), and it will be investing over 100 million pesetas to robotize its line.

The robots will give Saci greater production flexibility, with the resulting expansion of its product line, and enable it to enter new markets such as toys and motor vehicles. The Industry Ministry will subsidize half of the project on a nonreimbursable basis, while the CDTI will provide preferred credit for financing the other half of the investment.

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CSO: 3698/281

SCIENTIFIC AND INDUSTRIAL POLICY

STRATEGY, FOCUSES OF FRG RESEARCH POLICY DISCUSSED

Munich INDUSTRIEMAGAZIN in German Aug 85 pp 43-46

[Article: "More Leeway for Industry"]

[Text] The Ministry for Research and Technology can draw up a positive interim balance sheet: direct research promotion was cut back, unpromising projects removed from the promotion program, and policy was focused on key technologies. Cooperation with industry also has improved, and Riesenhuber observes clever reserve in the case of costly cooperation on a European basis.

Research Minister Heinz Riesenhuber was always at the top of the class--in school, at the university, and in his profession as a chemist. And now he occupies that place also in the Bonn cabinet of Dr Helmut Kohl. Although that doesn't take much in the opinion of critical observers, one must come to the conclusion that, so far, the minister has been successful in his job.

There have been no mishaps or scandals, and even the opposition treats him relatively gently. If he manages to get through the discussion about the fast breeder in Kalkar without a loss of image, he will have passed another major test.

A Change in Direction

Riesenhuber started his job as research minister by overcoming the crisis surrounding the fast breeder reactor, which today is again a highly controversial issue. At the beginning of the 1980's, its cost overruns became so great that Riesenhuber's predecessor, Andreas von Buelow, would have liked to dispose of the project once and for all. But during the most critical phase of the program, the Schmidt government also was in crisis and, lastly, at its end.

Riesenhuber managed to close the financing gap of about DM 2.7 billion, and with a much higher share of self-financing by industry involved in the project than could have been expected.

One of the first measures he took was to re-orient direct research promotion, the hobby horse of Social Democratic ministers. In the future, concretely defined projects--be it the car of the future, the automatic baggage cart at the Frankfurt train station, or travel information via computer--would be supported only if the respective firms also contributed an appropriate share of the costs.

Today, the average promotion ratio for enterprises stands at 50 percent. In the past 2 years, in some cases this ratio stayed significantly below that figure. Result: the government mobilized more research capital with fewer funds. In 1982, DM 1.00 of subsidies on the average generated DM 1.49 of research expenditures by industry; in 1984, it resulted in DM 1.67.

In addition, expenditures for direct research promotion were cut. The minister's reason: "When it comes to defining the tasks to be solved, the government should exercise the greatest reserve." Riesenhuber doubts whether the research bureaucrats who select the applicants even know what is good for the market.

Expenditures for direct promotion fell from DM 2.1 billion in 1982 to DM 1.6 billion in 1985, a drop from 32 percent to 22 percent of the ministry's total budget. The number of projects being promoted also dropped by almost 30 percent since 1982.

On the other hand, indirect promotion--instruments to improve general conditions for research, development and innovation--has been expanded considerably, from DM 800 million in 1982 to DM 1.5 billion this year. Instruments of indirect promotion are, above all:
--tax concessions;
--flat-rate subsidies for proven research personnel in the enterprises;
--expansion of research and development concerning orders, which is primarily used by small and medium size enterprises without their own research personnel, and
--promotion of the founding of enterprises with technology orientation.

The funds for these measures will again be increased in the coming year--by almost 50 percent.

It is true that indirect promotion frequently has only incidental effects; on the other hand, it gives the enterprises greater leeway for their own initiatives. In direct promotion, they were often so restricted by the research bureaucracy that many, particularly small and medium size firms, waived it entirely. They had neither the time nor the personnel to cope with the bureaucratic application procedures. They could not compete with the large enterprises which maintain entire application departments in order to get at the Bonn handouts.

The fact that in redirecting promotion, the research minister of necessity had to take on large industry, which in the past had profited most from direct promotion, only strengthened the credibility of his policy. And

generally speaking, relations between the research ministry and industry has become much more relaxed.

The "brain transfer" from science to industry and vice versa, which formerly had been considered by science as rather uncouth and abnormal, is now supported by the government.

Now as before, the emphasis of Bonn research policy is on basic research. Riesenhuber: "Basic research only has to pose questions,it has no direct product interest. It is the government's special task to ensure its growth. Basic research assumes the tasks not tackled by others."

Riesenhuber has increased expenditures for this area; the proportion of expenditures for basic research vis-a-vis the total budget of the research ministry rose from 27 percent (1982) to 36 percent (1986).

Runaway Costs

Nonetheless, the basic researchers also suffered disappointments, for example in the Juelich nuclear research station where the Spallation Neutron Source (SNQ) had been planned. The project, with whose aid the researchers wanted to penetrate even deeper into nuclear physics, already during the planning stage developed a cost frame (within a short time, from several hundred million DM to DM 3 billion) which raised fears of a second Kalkar.

Since the Juelich scientists could not interest international participants, Riesenhuber had the project halted (also see the interview with the minister on page 46).

The research minister proved that he has the courage to stop projects that are already under way by canceling Growian, the large wind energy installation at Kaiser-Wilhelm-Koog in northern Germany which, with DM 90 million in subsidies, is one of the larger research investments. After unsatisfactory attempts at operating it, additional investment millions would have been required. As it became clear that the uses of this new large-scale technology--the installation was overdimensional--would hardly get beyond demonstration purposes, the research minister gave the stop signal.

Of course, it is easy for Riesenhuber to take dismantling measures as long as it concerns projects started by his predecessors. The true test will only come if one of the projects initiated by him gets into difficulties.

New points of emphasis of Bonn research policy are primarily key technologies:
--information technology,
--material research,
--biotechnology, and
--space research.

The financial expenditures for key technologies, in which Riesenhuber sees the work places of tomorrow, have risen by disproportionately large amounts.

Energy research, on the other hand, which had been pampered and coddled since the oil crisis in the 1970's (it was always serviced with one-third of all Bonn research funds), is being reduced noticeably, nuclear energy research in a particularly drastic manner, which next year will drop for the first time clearly below the DM 1 billion mark (reduction from DM 1.1 billion to DM 800 million).

This almost 30 percent reduction for nuclear energy can be seen as a signal, and it has caused concern in the nuclear industry.

These enterprises, accustomed to Bonn's billions, will have to resign themselves to even greater cutbacks. The demand of the nuclear lobby to continue promotion of breeder technology will probably come up against a brick wall with the research minister. Riesenhuber has committed himself several times: "The successor project for the breeder in Kalkar is solely the concern of industry."

Costly Investments

Even if he wanted to continue promoting nuclear energy, he does not have the funds for it. The minister has assumed financial risks for two large projects, in one of which he does not seem particularly successful. This is the German participation in the U.S. space station Columbus, which will cost his budget DM 4.5 billion, including participation in the French carrier rocket Ariane. The finance minister has approved additional funds for the Columbus project, but his approval has to be taken with a grain of salt. If German participation in the Columbus project had not been dictated by overriding considerations of alliance policy, Riesenhuber would hardly have become involved in it, given the narrow financial leeway of his budget.

His tendencies to commit himself to large technological projects are not very pronounced. He is skeptical about the U.S. SDI program (Strategic Defense Initiative), but also about the German-French Eureka project, the French initiative for an agency to coordinate European research, which is to develop large joint projects such as supercomputers, artificial intelligence, new basic materials, sensors, high-speed railways, and super lasers.

Riesenhuber has not been infected by the euphoria of a European answer to the U.S. star wars program. It is not incidental that, at the time of the Eureka debate, he came up with the terse formulation: "Technology is not a purpose unto itself, but an instrument for improving the living conditions of men." In his opinion, what is "desirable is not a Europe of technology, but the use of technologies which will permit man to live in peace with nature."

One of his closest colleagues formulates the research minister's philosophy and skepticism even more pointedly: "One cannot develop a large chip if we do not know how it will be used and what problems will be solved with it."

INDUSTRIEMAGAZIN interview with Minister for Research and Technology Dr Heinz Riesenhuber on the major points of his policy.

Question Mr. Minister, there is much concern in the FRG that we are technologically backward. Do you share this concern?

Answer There is no reason to hold a pessimistic view of the productive capacity of German industry and technology in the world market. The 1985 Hannover fair, for example, and many indicators show that the FRG, starting from today's strong position in the world markets, possesses a productive and expandable basis in order to meet the challenges of the future and the world markets.

Question What supportive protection can technology policy give? When and where should the government provide support?

Answer There are a great many tasks, but the government should concentrate on creating basic conditions. In view of the challenges facing the FRG in international competition, the Federal Government wants to give new impulses through the affirmation of freedom of research, through government restraint vis-a-vis research and development in industry, especially with regard to presetting conditions, through affirmation of technical progress, recognition of productivity and the challenge to top performance in research, development and innovation, in order to strengthen the productive capacity of science, research and development as well as the innovative power and competitive capacity of industry in the FRG.

Question Mr. Minister, you have stopped two large projects: the Great Windmill Installation at Growian and the Spallation Neutron Source SNQ. Is this a rejection of large projects favored by you up to now, or at least a challenge?

Answer First of all I would like to state that I have never "favored"--as you put it--the Great Wind Energy Installation (Growian). It is a wrong energy policy decision from the 1970's. It has cost about DM 90 million so far, repair costs of between DM 10 million and 30 million were needed, without any guarantee of continuous operation after the repairs were made. Therefore, closing down and demolishing the Great Wind Energy Installation is a dictate of good sense. We now concentrate on promoting research and development at universities, demonstration projects in the Third World and a few selected projects in Germany, such as Helgoland.

Question What led to the decision to stop SNQ?

Answer SNQ is a project which is more expensive than the entire German contribution to the space station. Those are dimensions which per se could become dangerous to other projects. The starting point in the case of SNQ was the following: according to the original estimate, total costs were to stay below DM 1.2 billion. Experts have now computed that DM 2.9 billion are needed. In this, some of the costs are only estimated, and experience shows it doesn't get cheaper. The decision to put this project on the back burner--a project that was to be financed entirely on the national level, without international contributions--in this case is rather a liberation for basic research which feels threatened by large projects. Furthermore, I want to point out that basic research has a larger share in my budget than ever before.

Question You were very reserved in your assessment of the planned technological cooperation in Europe, the Eureka program. What does the project mean for the FRG?

Answer Eureka will consist of projects which we can carry out better with European partners than alone. There is a wide range with regard to the scientific-technical projects. They can be high technologies directed at markets: a highest-integrated chip, a supercomputer, a robot capable of learning from the field of artificial intelligence. They can also be projects from the area of environmental protection dealing with highly toxic industrial waste. Here we must deal with problems encountered in all industrial countries of Europe. Furthermore, we must also consider very large infrastructures, that is, rapid transit systems, and cooperation in communications technologies. In these tasks we need our European partners in order to jointly solve problems which we cannot handle individually.

Question In your opinion, what are the most important preconditions in order to implement the initiative?

Answer We must be more flexible in the preparation of decisions. The selection of the form of cooperation must also be flexible in order to tailor it appropriately to the respective requirements of each project. The management of Eureka must be unbureaucratic.

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CSO: 3698/279

SCIENTIFIC AND INDUSTRIAL POLICY

REPORT OUTLINES FRENCH OPTICS PROGRAM

Paris L'USINE NOUVELLE in French 2 Jan 86 p 22

[Article by Alain Dieul: "The Proposals of the Jerphagnon Report"]

[Text] Paris--The optics commission headed by the former CNET [National Center for Telecommunications Studies] director anticipates two main actions to boost the competitiveness of the French optics industry: a training effort and the development of industrial research.

Will attention be paid to the proposals in the optics report presented last week by Jean Jerphagnon, formerly director of CNET and currently director of Alcatel-Thomson? One should hope so, because the importance of the stakes which motivated the demand of the French Ministry of Research and Technology is increasing every day. Even on a European level, the French are in a weak position compared to the English and the Germans.

Supported by the National Agency for Technical Research, the optics commission has defined the priorities. The first proposal regards training. A number of engineering schools should be equipped very soon with lasers and optical equipment. However, the lack of qualified staff is most badly felt on the technicians' level. The creation of a training network of technicians skilled in optics, electronics and signal processing should solve this problem.

The commission also demonstrated the lack of manpower in industrial research compared to manpower in fundamental research. If one adds the number of researchers in CNRS [National Center for Scientific Research to those in the universities, the total is about 800 people, as opposed to 350 research engineers in industry. Thus, the second measure concerns launching projects spread over 1 to 2 years, with a budget of approximately Fr 1 million, intended to encourage closer relations between these two sectors. They may deal, for example, with the industrial application of thin optical layers, metrology and control of optical surfaces, or the networks of multi-purpose optical fiber sensors. Additionally, pilot projects of a much more ambitious nature, whose budget could amount to between Fr 10 and Fr 100 million over 3 or 4 years, aim at industrializing products and technologies: applications of optical sensors in electrical engineering or pure chemistry, laser machine tools and industrial process control. "Even if these projects sound futuristic, one of them might soon be defined," declared Jean Jerphagnon.

25025/12624
CSO: 3698/1056

SCIENTIFIC AND INDUSTRIAL POLICY

ROLE OF FRANCE'S RESEARCH MINISTRY, S&T POLICY QUESTIONED

Paris L'USINE NOUVELLE in French 2 Jan 86 p 23

[Article by Robert Clarke: "The Gaul, the Cowboy and the Samurai"]

[Text] Last week a small bomb exploded in the research world. An article in the very serious British scientific magazine NATURE made reference to a report which Laurent Fabius, then minister of industry and research, had ordered from Jean-Jacques Salomon in May 1984. Salomon is one of the rare French specialists in scientific policy. He has been inspiring research at the OECD [Organization for Economic Cooperation and Development] for some 10 years, and he is a professor at the National Conservatory of the Arts and Professions].

This report, presented to the present research minister last July, has remained confidential until now. As some indiscretions had circulated, Jean-Jacques Salomon's report, entitled "The Gaul, the Cowboy and the Samurai", came out of hiding. It had a note signed by the cabinet director indicating that the minister of research did not want distribution of the text, "which limited its perspective to the period preceding his arrival at the ministry and thus neglected to take into account the reforms and projects realized or announced since then. The study, thus outmoded from the very moment it was finished, could not make a useful contribution to any reflection, nor validly generate action."

It seems that the entourage of Hubert Curien, minister of research and technology, was shocked by the impertinent aspect of Salomon's report, which does not mince words in criticizing sharply not only research and development policy but also educational policy. Top officials are still very sensitive to criticism, especially when it is correct, which is sometimes the case.

Jean-Jacques Salomon's report focuses on several themes. One theme is particularly sensitive for senior officials, as it attacks the inertia and the obsolescence of the bureaucracy in the field of research and development. It confirms that the offices administering the programs have taken precedence over the think tanks, causing the latter's decreasing efficiency, extending their channels [of communication] and delaying decision making. He even questions the efficiency of the ministry of research in its present form.

"Of course," he says, "it is necessary to have a minister representing scientific research in the government. However, does it require an entire ministry? You need a consultation and decision-making structure that is as close as possible to the prime minister and which is charged with defining and following up the development of new techniques without any operational management responsibility. But is a government service behind all this needed?"

Jean-Jacques Salomon has similar criticism for the Ministry of Education, which will certainly have ruffled a lot of feathers in the administration. He states calmly that the countries whose educational systems function the best have a Ministry of Education whose bureaucratic expansion is most limited. Without a smile, he proposes that this ministry should be limited to units reflecting on the policy to follow, the resources to distribute and the evaluations to be made, whereas the institutions would draft their own programs freely and recruit their own teachers.

As far as research and development are concerned, Jean-Jacques Salomon denounces the sluggishness of large programs that are certainly useful in fundamental research and in military and space matters, but useless anywhere else. He regrets that in too many fields the state continues its "arsenal policy," a strategy that he considers inadequate for new techniques in a market in which demand always outweighs supply and in which only the users decide on the manufacturers' success. "In this field," he says, "more flexible formulas should be found which would provide more initiative to industrialists." The Supreme Council of Research and Technology, which depends on the ministry, also supports this point of view.

"The countries that respond most easily to the challenges of modernization," concludes Jean-Jacques Salomon, "are not those where the state intervenes the most in industrial research, but those that best motivate industry to get directly involved in research activities." In his opinion subsidies should be diminished, but tax benefits should be improved. On the political level, we need a forum for strategic thinking and discussion, rather than a tool for intervention.

25025/12624
CSO: 3698/1056

SCIENTIFIC AND INDUSTRIAL POLICY

FIAT GAINS CONTROL OF SNIA BPD'S R&D EFFORT

Rome IL TEMPO in Italian 30 Nov 85 p 25

[Article by Eugenio Occorso: "Fiat Has Absorbed Snia Bpd--A Very Strong Company In the Chemical Field"; first paragraph is IL TEMPO summary headings]

[Text] A complex exchange of stock--Sorin Biomedica to Snia; the Turin company actually already controlled the textile group but had only 20 percent of the capital, a percentage slightly higher than that of Mediobanca; now it will underwrite an increase of capital, to be effected next spring, and will give Snia in exchange Bioengineering International, a Dutch company, which owns 7 percent [as published] of Sorin.

Yesterday was without a doubt one of the days most crammed with news in the recent history of the Italian stock market. While in Turin Mr Agnelli was announcing broad changes in the stock arrangements of Montedison, probably the company most talked about in the stock exchange in the past few months, in Milan the boards of Snia Bpd and Internazionale Holding Fiat (a company 100 percent-owned by Fiat Spa) were approving another fundamental transaction--Internazionale Holding Fiat will give "Bioengineering International Bv" to Snia Bpd in exchange for an increase in capital which will be reserved for the conferring firm (that is, Snia Bpd) [as published]. Let's see what this involves.

Bioengineering Internationale B.V., also called Bei for short, is a Dutch company which owns 75 percent of Sorin Biomedica Spa (the company about to be listed on the stock exchange which went like wildfire in the course of a preliminary appearance on the market about a week ago) and controls other holdings in the field. The transaction fits into the Snia Bpd program of diversification into sectors characterized by strong innovative components and high rates of growth. In this perspective--says a joint Snia-Fiat communique--the group of companies controlled by Bei will be able to take good advantage of of synergy in technology and products developed by Snia Bpd research in the fields of defense and space activities, in fibers, and in refined chemicals.

The increase in the capital of Snia Bpd, reserved for the conferring company, will be made on the basis of an appraisal of Bei made by an expert appointed by the president of the Milan court. Completion of the transaction will be effected at a special assembly of Snia Bpd to be held in the spring of 1986.

When the transaction is completed, increased participation in the capital of Snia Bpd will involve an enlargement of the area of "consolidation" of the Fiat group.

Regarding the Snia Bpd group, it is well to recall that with almost 2,100 billion in sales in 1984, 117 billion in consolidated net profit, holdings in about 50 companies and 15,000 employees it is one of the largest industrial complexes in the country and in some sectors occupies a leadership role at the international level. Companies of the group are active in the areas of defense and space, chemical fibers, chemicals properly so-called, textiles, engineering and mineral exploration. As regards sales, Snia's are at present about 10 percent of the total sales of the Fiat group. which, with this transaction, takes over once and for all the almost complete ownership of the stock (up to now, even though Cesare Romiti has been president of Snia, Fiat had only 20 percent of the capital and a controlling share in a controlling syndicatesto which Mediobanca in particular belonged.)

Snia Bpd has an important role in the most important domestic and international space programs and responsibility for the solid propellant of the European Ariane launcher. The companies of the group that operate in the more "traditional" chemical fiber sector have a significant store of know-how and are at the forefront in technology and plants. Snia Fibre is, to sum up, one of the principal European producers of fibers for clothing, industrial textiles and furnishings. In the last several years great innovations have transformed the appearance of the textile companies of the Snia group. The level of many of the "specialties" produced by the group has been raised, as in the case of the Cotonificio Olcese-Veneziano, and the "fashion" content of prestigious trade names increased, such as that of Fila, which has been a leader of the sport clothing sector for a long time in various countries of the world. Completing the activities of the Snia group are its engineering and mineral exploration work, which constitute a constant source of notable economic flows, guaranteeing an important role for the company in sectors of strategic interest.

Sector	Total Invoiced (in billions of lire)			Personnel of All Companies		Investments (in billions of lire)	
	1983	1984	% change	31-12-83	31-12-84	1983	1984
Defense and Space	532.5	652.5	+22.5	4,485	4,345	33.1	36.2
Fibers	610.1	739.9	+21.3	5,084	4,862	35.2	51.9
Chemicals	257.8	309.4	+20.0	1,443	1,455	10.7	16.6
Textiles	206.3	352.8	+71.0	2,476	2,660	10.8	9.4
Other	158.3	122.7	-22.5	742	754	19.8	22.4
	1,765.0	2,177.3		14,230(1)	14,076(1)	109.6	136.5
Internal transfers	(61.8)	(85.2)					
Net invoiced	1,703.2	2,092.1	+22.8				

(1) In addition to 475 and 223, respectively, on 31-12-83 and 31-12-84 of companies controlled but not wholly integrated.

Principal Economic and Financial Data of the Group (in billions of lire)

	1982	1983	1984
Net invoiced	1,530.0	1,703.2	2,092.1
Gross operating margin	221.9	283.1	400.2
% of invoiced	14.5	16.6	19.1
Net operating margin	123.2	160.7	238.3
Depreciation	92.7	115.0	154.6
Net profit	(34.5)	19.9	116.6
Investment in plant	84.2	92.0	117.0
Net inventories (1)	886.2	885.2	881.0
Working capital (1) (2)	249.3	350.9	516.8
Net financial position (1)	865.2	776.9	781.1
Fixed assets (1)	877.2	1,139.2	1,170.9
Net capital (1)	232.6	408.8	514.6
No. employees	15,799	14,230	14,076

(1) End of period figures.
(2) Consists of: various commercial credits net of funds, reserves, interest and rediscount, commercial and miscellaneous debits.
(3) Total number of employees of all companies, Italian and foreign—excluded are employees in special pay status.

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CSO: 3698/244

SCIENTIFIC AND INDUSTRIAL POLICY

HIGH TECH PARKS TO BE BUILT NEAR MADRID, BARCELONA

Fast-Growing Center

Madrid TIEMPO in Spanish 27 Jan 86 pp 47-51

[Article by Manuel Hermogenes]

[Text] It is the early 1990's. Along the highway from Madrid to Colmenar Viejo, a kilometerpost reminds motorists that it is 20 kilometers from Tres Cantos to downtown Madrid. The arrow indicates the road to the industrial park. A hundred or so companies share the parcels of land there. Some 20,000 jobs have been created, most of them filled by highly skilled personnel who have turned the place into Madrid's Silicon Valley.

Most of these companies are involved in research and the new technologies: computers, biotechnology, telecommunications, complex chemical processes.

It all began in 1985 when the U.S. multinational AT and T decided to set up shop in the area. Until then, the Tres Cantos industrial park was home to just over a dozen companies; the fallout from the American giant caused their numbers to grow until it became the largest high tech park in Spain.

This futuristic vision of what Tres Cantos will be like in a few years is largely in keeping with the intentions of the executives of the company that is promoting this "satellite town" of Madrid. According to Ramon Romo, the president of Tres Cantos, S.A., the industries located in the industrial park around this residential area will provide jobs for more than 20,000 people in 6 to 8 years.

When Vicente Mortes Alfonso, who was then housing minister, decided in 1970 to create a bedroom community near Madrid, he could not have imagined that 15 years later the land selected for a city of 35,000 dwellings and 150,000 residents was going to be chosen by the U.S. multinational AT and T for its Spanish base of operations. The plans of the then housing minister were quite different. The country was emerging from the 1960's. The major capitals had become too small to house the immigrants arriving in search of work.

Over the years, the industrial park near this bedroom community, which was initially conceived as a city of the future, has become the real engine of its

growth. The 120 hectares reserved for industry, which are in modest contrast to the 1,691 reserved for the entire project, are now 70 percent occupied by 67 firms, 17 of which are already operating.

The future plans for this industrial park 20 kilometers from Madrid are more ambitious, though. By offering advantages to the companies that set up shop in Tres Cantos, an enclave included in Madrid's Urgent Reindustrialization Zone (ZUR), the autonomous community wants to turn the park into a high tech industrial center, a sort of Silicon Valley Madrid-style.

First Results

These advantages, including government subsidies for 30 percent of total investment, low-interest loans and tax breaks, have borne their first fruit. Besides AT and T Microelectronica de Espana, seven other companies have selected the site as the ideal spot for their facilities.

The projects under the Tres Cantos ZUR entail investments of close to 40 billion pesetas and will create nearly 1,000 jobs. Some of the incoming companies are involved in biotechnology, such as the Corporacion Biologica Farmaceutica (CBF), which will begin building right away with a 200-million peseta investment. Another is Laboratorios Serono, which will be spending 730 million on its project. Laser Quanta will earmark 175 million for the construction of an industrial plant devoted to laser technology.

Another project under the Tres Cantos ZUR is that of Telecomunicaciones y Control, which will invest 500 million pesetas and create around 70 jobs.

These are some of the eight projects that the office of the Madrid ZUR has approved for the companies that will locate in the industrial park. The companies' interest in locating here is reflected in how busy the office has been. Its manager, Francisco Javier Gil says: "During the first 6 months that the office has been in operation, we have received more than 3,500 calls from companies inquiring about the advantages of locating there." These calls have led to more than 1,300 interviews, which have given rise to 67 projects, 25 of which have been approved for the entire autonomous community.

Furthermore, however, the Labor and Industry Advisory Office of the Madrid Community has set in motion its PITA Plan (Advanced Technological Innovation Park), an attempt to turn the Madrid area into an advanced center for firms working with state-of-the-art technology. The Tres Cantos facilities are going to play a major role in this plan. Another 36 hectares will be added to the 120 hectares of industrial land in the original park project, and they will house the companies that want to locate in Tres Cantos under the plan. So far the autonomous community has approved 38 investment applications totaling some 3.5 billion pesetas.

And it has all been thanks to the "American friend." In just a few days, Charles L. Brown, the president of AT and T and one of the most powerful men in the United States, and Luis Solana, the president of Telefonica, will lay the cornerstone of what will soon be AT and T Microelectronica de Espana's computer chip plant.

The First Chip

The company, in which AT and T owns 80 percent of the capital and Telefonica the remaining 20 percent, will begin operations in early 1988. Two years later, once full production has been reached, the plant will be putting out $200 million worth of chips. The AT and T Microelectronica de Espana facility will require an investment of close to 35 billion pesetas. Some 30 percent of the investment, a bit more than $60 million, will come from the Spanish Government.

AT and T Microelectronica de Espana will be spending a great deal of money to locate in the Tres Cantos industrial park, and its plant will generate quite a few jobs. It will have a payroll of 700, the overwhelming majority highly skilled Spaniards.

The happy marriage between AT and T and Luis Solana's company was not, however, the upshot of what could be described as a calm courtship. After Luis Solana and Peter Thomsen, representing Telefonica and AT and T respectively, signed the memorandum of understanding in the summer of 1984, there were some very rough stretches along the road to implementing the agreement between the two companies.

The Reagan administration, which had to grant the permit authorizing AT and T to export high technology, had misgivings about the ultimate destination of the new technology that Spain was going to acquire. It feared that it could wind up in the hands of "hostile countries," as George W. Foyo, AT and T's representative in Spain and a key figure in the negotiations, acknowledged at the time. Foyo, a Cuban-born nationalized American citizen of Spanish ancestry, will be the managing director of AT and T Microelectronica de Espana.

At that point, the U.S. administration launched a vigorous diplomatic offensive to get Spain to join COCOM, the international agency that controls high tech exports. U.S. mistrust was ultimately dispelled when the Spanish Government gave assurances that the technology from AT and T would not be reexported to third countries in the Eastern bloc. A year after AT and T and Telefonica signed their agreement, the U.S. Government granted the export license that AT and T Technologies had requested.

Just a few kilometers from Madrid, Tres Cantos has very easy access to the Spanish capital. Just 20 kilometers separate the industrial park from Barajas Airport and the joint Torrejon de Ardoz Base, something that Telefonica's American partners unquestionably set great store in.

In the opinion of Ramon Romo, the president of Tres Cantos, one of the most important reasons why AT and T decided to locate here was the park's proximity to the Autonomous University of Madrid, which could be a breeding ground for skilled personnel. We should not forget that graduates from Stanford University played a major role in the emergence of California's Silicon Valley. No less importantly, the Cantoblanco campus is home to one of the most advanced research centers in Spain, the Molecular Biology Center.

Infrastructure

The infrastructure in Tres Cantos was another decisive factor. The park has urban gas service. A telephone exchange with a 35,000-line capacity is already on line. The purifying plant that serves the park was designed for a population of 25,000.

The railway is another important means of access. At present, there is a stop at Tres Cantos along the Madrid-Burgos line and it will be turned into a station in the very near future. Next May RENFE [Spanish National Railroads] will start freight service between Tres Cantos and Madrid.

The town itself is prepared to grow in accordance with the needs of its future residents. Construction has already begun on 3,600 mostly single-family dwellings that could house the families of future Tres Cantos workers.

In the years to come Tres Cantos will become a major industrial site. Originally conceived as a showy city with a modest industrial park, it is going to be one of the most important high tech parks in the country. And all thanks to the influence of "Mr Chip."

Barcelona Park

Barcelona LA VANGUARDIA in Spanish 23 Jan 86 p 42

[Text] An agreement is being signed today between the Metropolitan Corporation of Barcelona, the company Control Data, the Free Zone Consortium, ENISA [National Innovations Enterprise] and CEAM to conduct a study on the Valles high tech park.

The Generalitat [autonomous government] of Catalonia will defray 3 million of the 15 million peseta cost of the study on setting up such a park, which is also known by the name "Silicon Valles" because of its similarity to the valley in California that is home to so many microelectronics firms. Circles close to the Generalitat regard its contribution as an indication of its interest in supporting the project, even though it will not be involved in building it.

The future Valles technology park will consist of various projects, mostly in robotics and computers. It will house three types of services: a general services center, a technological development office that will facilitate access to the latest computer and electronics technologies, and the so-called Business and Technological Center, which will offer floor space and services to the newly formed companies in the park.

The planned technology park has created great expectations in the Valles area. As Emilio Peralta, the chairman of the Sabadell Industry Chamber's Industry Commission, stated yesterday, "the Valles district could become Spain's Silicon Valley. If some years ago Sabadell was a pacesetter in the textile revolution and later the metallurgy industry revolution, it is playing the same role today in computers, inasmuch as leading-edge companies in this important sector are locating in our city."

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TECHNOLOGY TRANSFER

BRIEFS

CHINESE SEEKING EUREKA ROLE--During the recent Franco-Chinese meetings, China expressed its desire to participate in the EUREKA project. A joint study program with INRA [National Institute for Agronomic Research] on artificial seeds should be made public in early 1986. In addition, France wants to collaborate with China on a study of pharmaceutical substances of vegetable origin. According to Daniel Thomas (adviser for biotechnology to Minister H. Curien), the enormous potential of Chinese medicinal plants could be of great value for biotechnology. (Source: NATURE, 3 October 1985.) [Text] [Paris BIOFUTUR in French Dec 85 p 19] 25026/12624

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